



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Samuel M. Babb et al. Confirmation No.: 6460  
Application Serial No.: 10/650,028  
Filed: August 27, 2003  
Title: SYSTEM, METHOD, AND COMPUTER-READABLE  
MEDIUM FOR REDUCTION OF COMMUTATION-RELATED  
ACOUSTIC NOISE IN A FAN SYSTEM  
  
Group Art Unit: 2837  
Examiner: Duda, Rina, I.  
  
Docket No.: 200309579-1

**DECLARATION OF JEFFREY S. WEAVER  
UNDER 37 C.F.R. SECTION 1.131**

Mail Stop: Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

I, Jeffrey S. Weaver, a co-inventor of the above-referenced patent application, enclose hereto as Exhibit A, a true copy of an invention disclosure form, with dates and portions redacted as noted, which was received by the Legal-Intellectual Property department of Hewlett-Packard Company on a date prior to April 30, 2003, in the ordinary course of business as part of Hewlett-Packard Company's invention disclosure program, and which indicates a conception of the invention which is the subject of the above-referenced patent application on a date(s) prior to April 30, 2003. In accordance with Hewlett-Packard Company's invention disclosure program at that time, upon receipt of an invention disclosure document from an inventor, the invention disclosure document is dated with the date of receipt by the Legal Intellectual Property department of Hewlett-Packard Company and assigned a docket number.

**CERTIFICATE OF MAILING/TRANSMISSION (37 C.F.R. §1.8(A))**

**MAILING**



I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to:

MAIL STOP: AMENDMENT  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**FACSIMILE**



I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number (703) 872-9306 on:

Date: July 14, 2006

Signature:

*Cindy C. Dioso*  
Cindy C. Dioso

DOCKET NO.: 200309579-1

PATENT

The invention that is the subject matter of the above-referenced application was conceived while working in the United States for, and an employee of, Hewlett-Packard Company. The invention disclosure form attached hereto as Exhibit A includes an explanation of the subject matter of the claims of the present application. Specifically, at least page 3 of the invention disclosure form includes an explanation of the subject matter of the claims of the present application.

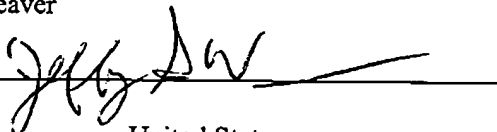
I also enclose hereto as Exhibit B true copies of sample correspondence, with portions redacted as noted, with counsel pertaining to the preparation of the above-referenced patent application which was received on a date after April 30, 2003, and which indicates, alone and/or in combination with the invention disclosure form, diligence in the completion of the invention which is the subject of the present Application from a time prior to April 30, 2003, continuously up to the date of filing of the above-referenced patent application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**SIGNATURE**

Jeffrey S. Weaver

Signature



Date:

7-14-2006

Citizenship:


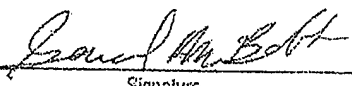

United States

Residence:

Fort Collins, CO

# EXHIBIT A

Write in Dark Ink on Front Side Only, Please

		<b>INVENTION DISCLOSURE</b>		REDACT		PAGE ONE OF <u>3</u>	
PDNO <u>200309579</u>		DATE RCVD				ATTORNEY <u>Kmtt</u>	
<i>Instructions: The information contained in this document is HP Confidential and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.</i>							
Descriptive Title of Invention: <p style="text-align: center;">Fan Noise Reduction via Drive Modulation</p>							
Name of Project: n/a							
Product Name or Number: Rockwood							
Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s): Redact							
Was a product or prototype including the invention (i) announced, offered for sale, or sold to any third party (for example, customer, supplier, contract manufacturer), or (ii) sold to HP by, for example, a supplier or contract manufacturer, or (iii) is such activity proposed? If so, when and to whom?: Redact							
Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s): Redact							
<i>If any of the above situations will occur within 9 months, call your HP attorney or the Legal Department now at 1-800-4919 or 970-698-4919.</i>							
Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.) Redact							
Was the invention built or tested? If so, the date: Redact							
Was this invention made under a government contract? If so, the agency and contract number: Redact							
Description of Invention: <i>Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).</i>							
A. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)							
B. Advantages of the invention over what has been done before.							
C. Problems solved by the invention.							
D. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).							
Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on this date: [ Redact ]							
Redact	Samuel M. Babb		Redact	Redact	PSG / WGBU		
Employee No.	Name	Signature	Telex	Mailstop	Entity & Lab		
Name							
Redact	Jeffrey S. Weaver		Redact	Redact	PSG/WGBU		
Employee No.	Name	Signature	Telex	Mailstop	Entity & Lab		
Name							
Employee No.	Name	Signature	Telex	Mailstop	Entity & Lab		
Name							
<i>(If more than four inventors, include additional information on another copy of this form and attach to this document)</i>							

Redact

Write in Dark Ink on Front Side Only, Please

INVENTION DISCLOSURE		HP Confidential	PAGE 2 OF 3
Signature of Witness(es): (Please try to obtain the signature of the person(s) to whom invention was first disclosed.)			
The invention was first explained to, and understood by me (us) on this date: [Redact]			
Full Name	Signature	Date of Signature	
Kelly J. Pickett	[Signature]	Redact	
Full Name	Signature	Date of Signature	
Stacie F. Mathis	Stacie F. Mathis	Redact	
Inventor & Home Address Information: (If more than four inventors, include addl. information on a copy of this form & attach to this document)			
Inventor's Full Name			
Samuel M. Babb			
Street			
Redact			
City		State	Zip
Redact		Redact	Redact
Do you have a Residential P.O. Address? P.O. BOX		City	State Zip
Redact			
Greeted as (nickname, middle name, etc.)		Citizenship	
Redact		Redact	
Inventor's Full Name			
Jeffrey Scott Weaver			
Street			
Redact			
City		State	Zip
Redact		Redact	Redact
Do you have a Residential P.O. Address? P.O. BOX		City	State Zip
Redact			
Greeted as (nickname, middle name, etc.)		Citizenship	
Redact		Redact	
Inventor's Full Name			
Street			
City			
State		Zip	
Do you have a Residential P.O. Address? P.O. BOX		City	State Zip
Greeted as (nickname, middle name, etc.)		Citizenship	
Inventor's Full Name			
Street			
City			
State		Zip	
Do you have a Residential P.O. Address? P.O. BOX		City	State Zip
Greeted as (nickname, middle name, etc.)		Citizenship	

Redact

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<b>Description of Invention:</b> Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).	
<b>A. Description of the construction and operation of the invention (include appropriate schematic, block, &amp; timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)</b>	
<p>Electrically powered fans, especially those types used in computer and electronic equipment produce acoustic noise that people find objectionable. One type of prominent acoustic noise is generated by commutation events causing torque modulation of the rotor with an impulse-like profile. Periodic commutation events are continuously generated as long as the fan motor is being driven. This kind of noise is characterized by a buzzing sound. It is most noticeable at lower RPM, but is present at all times the motor is driven. It is present in most common low-cost fans used in electronic equipment due to the low-cost drive schemes used to commutate the fans.</p> <p>This invention detects the commutation event using any common, well-known-in-the-art method. Thus, a periodic signal is generated which represents the commutation frequency and the phase, or timing of the commutation events. Using a phase locked loop (which is also well known in the art), or the equivalent, the timing of the commutation event is predicted and the drive to the fan motor modulated to reduce the impulse in the generated torque modulation. This may be accomplished by many means, but the easiest is to simply reduce the drive to the motor during the commutation event. This drive reduction may take the form of smoothly adjusting the voltage supplied to the motor, or smoothly adjusting the duty cycle of a pulse width modulated drive, or many other obvious forms.</p>	
<b>B. Advantages of the invention over what has been done before.</b>	
<p>Significantly reduces generated noise, especially at low fan speeds with very little cost increase. Method can be applied to existing low-cost fans.</p>	
<b>C. Problems solved by the invention.</b>	
<p>Increases customer satisfaction and reduces annoyance.</p>	
<b>D. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).</b>	
<p>More expensive and sophisticated fan drives exist, but are relatively expensive.</p>	

Inventor: Saul M. Bell date: Redact Inventor: \_\_\_\_\_ Date: \_\_\_\_\_

Inventor: J. W. date: Redact Inventor: \_\_\_\_\_ Date: \_\_\_\_\_

Witness: [Signature] date: Redact Witness: Stacie J. Washie Date: Redact

Redact

## EXHIBIT B

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**From:** McDonald, Steven  
**Sent:** Tuesday, May 20, 2003 3:54 PM  
**To:** 'sam.babb@hp.com'  
**Cc:** 'jweaver@hp.com'  
**Subject:** 200309578; 200309579

Sam,  
The commutation disclosure is the '579 listed above. If you have any additional documents/schematics for the '578, please forward them as well.  
-Steve

Steven T. McDonald  
Munsch Hardt Kopf & Harr, P.C.  
1445 Ross Avenue, Suite 4000  
Dallas, Texas 75202-2790  
Direct Dial: 214.880.7667  
Direct Fax: 214.978.5309  
Email: [smcdonald@munsch.com](mailto:smcdonald@munsch.com)  
<http://www.munsch.com>

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**From:** WEAVER,JEFF (HP-FtCollins,ex1) [jweaver@hp.com]  
**Sent:** Thursday, June 05, 2003 1:13 PM  
**To:** McDonald, Steven  
**Subject:** RE: 200309579  
**Importance:** High

Steve,

Here is the diagram we discussed. Let me know what questions you have. I am at your disposal.

Jeff

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Jeffrey S. Weaver  
Hewlett-Packard Company  
redact  
redact  
redact  
redact  
redact

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From: McDonald, Steven  
Sent: Thursday, July 17, 2003 6:26 PM  
To: 'jweaver@hp.com'

Jeff,  
Attached is a rough draft for your review.

Redact

Redact  
Redact  
Redact

-Steve



drawings.pdf



200309579-1-draft.doc

Steven T. McDonald  
Munsch Hardt Kopf & Hart, P.C.  
1445 Ross Avenue, Suite 4000  
Dallas, Texas 75202-2790  
Direct Dial: 214.880.7667  
Direct Fax: 214.978.5309  
Email: [smcdonald@munsch.com](mailto:smcdonald@munsch.com)  
<http://www.munsch.com>

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August 20, 2003

VIA COURIER

Mr. Jeffrey S. Weaver

Redact  
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Redact

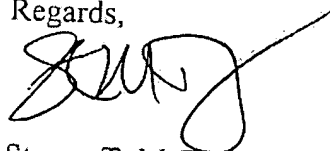
Re: U.S. Patent Application  
Entitled: *System, Method, and Computer-Readable Medium for  
Reduction of Commutation-Related Acoustic Noise in a Fan System*  
Your Ref. No.: 200309579-1  
Our File No.: 5804.267-1

Dear Jeff:

Enclosed are the Declaration and Power of Attorney for the Patent Application and Assignment of Patent Application documents. Please do not execute these documents until the application meets with yours and your co-inventors' approval. When the application is satisfactory, please sign the documents (**in blue ink**), exactly as it is typewritten and date each document. **Please note that the Assignment document should be dated twice.** After the documents are executed, please return all documents to me as soon as possible in the enclosed, self-addressed Federal Express envelope so that we may file same with the USPTO.

Should you have any questions or comments concerning this matter, please do not hesitate to contact me.

Regards,



Steven T. McDonald

STM:vrc  
Enclosures

Redact